REMARKS

Reconsideration of this application in view of the following remarks is respectfully requested. Claims 7-9 are canceled. No claims are amended or added. Hence, Claims 1-21 are pending in the Application.

I.   ALLOWABILITY OF CLAIMS 5 AND 6

Applicant appreciates the indicated allowability of Claims 5 and 6.

II.   ISSUES RELATING TO CITED REFERENCES

A.   35 U.S.C. 103(a) —*DI CARO* AND *MATTHEWS*

Claims 1-4 and 10-21 were rejected under 35 U.S.C. § 103(a) as being allegedly unpatentable over Di Caro, et al., AntNet: Distributed Stigmergetic Control for Communications Networks (*Di Caro*) in view of Matthews, et. al., US Patent No. 6,084,858 (*Matthews*). This rejection is respectfully traversed.

Claim 1

Claim 1 is directed to a computer-implemented method of discovering a network path that satisfies a quality of service (QoS) requirement, and recites:

> receiving, at a first router, **a first data packet that indicates** a destination and **said QoS requirement**;
> updating said first data packet to indicate an identity of said first router;
> determining whether **a least-delay path** from said first router to said destination **satisfies said QoS requirement**;
> determining whether said first data packet has visited any router in said least-delay path other than said first router;
> wherein **a first set of routers that are on said least-delay path is in a pheromone table on the first router**, and wherein a second set of routers that have been visited by said first data packet is indicated in said first data packet;
> if said least-delay path satisfies said QoS requirement and said first data packet has not visited any router in said least-delay path other than said first router, then sending said first data packet to a second router in said least-delay path; and
> receiving, at said first router, a second data packet that indicates a path taken by said first data packet to said destination.
> (Emphasis added)

Claim 1 recites receiving, at a first router, **a first data packet that indicates** a

destination and **said QoS requirement**. Claim 1 also recites determining whether **a**

least-delay path from said first router to said destination **satisfies said QoS**

requirement. Claim 1 further recites that **a first set of routers that are on said least-**

delay path is in a pheromone table on the first router. At least these features are not

disclosed in *Di Caro* and *Matthew*, taken individually or in combination.

Di Caro describes an AntNet in which entries in a routing table (*See* Fig. 1 on

page 325) store probabilistic values calculated based on the statistics collected by ant

packets. According to *Di Caro*, ant packets are generated periodically (item 1 on page

326). The destinations of the ant packets are statistically determined by formula (2),

which is statistically based on the data traffic pattern. *Id.* At each intermediate node,

each ant packet, known as traveling agent, is sent to a neighbor that is selected based on a

probability determined by the probabilistic values stored in the routing table (item 3 on

page 327; formulas (3) and (4) therein). A backward ant is sent back on the same path

after the ant packet arrives at its destination (item 6 on page 328). The information

carried by the backward ant is then used to update the probabilistic values in the routing

table (*see, e.g.,* formulas (5) and (6) on page 329).

Matthew, on the other hand, describes a method for selecting a communication

path over which to send a communication load between two stations in a connection-

oriented network. *See* Abstract; col. 4 line 22. According to *Matthew*, a network

management server (NMS) receives a request from a source switch (col. 4 lines 22-28).

The NMS in turn select a best path using a method illustrated in FIG. 2A. Specifically, a

Metric Z may be assigned to each of one or more paths between the source switch and the

destination switch (col. 4 lines 44-65). The best path (or optimal path) may be selected

with using the Metric Z. The best path is determined when a connection is set up, and maintained for the current connection (col. 4 line 66 – col. 5 line 4). Any load information from the current connection may be used only for the next connection. *Id.*

The Office Action argues that "page 326 Algorithm step 1" of *Di Caro* discloses receiving, at a first router, **a first data packet that indicates** a destination and **said QoS requirement**. This is a mischaracterization of *Di Caro*. That portion of *Di Caro* is entirely devoid of any mention of a first data packet that indicates said QoS requirement. That portion fails to disclose receiving a first data packet that indicates said QoS requirement, as featured in Claim 1.

In contrast to Claim 1 where a router forwards a packet that indicates the QoS requirement, *Matthew* only discloses that an NMS receives a request from a source switch for setting up a connection between the source switch and a destination switch. There is no disclosure in *Matthew* that the NMS **forwards** the request (which is the first packet of Claim 1 according to the Office Action) that **indicates the QoS requirement**. Therefore, the request received by the NMS in *Matthew* is not the same as the first data packet of Claim 1.

Furthermore, there is no disclosure in *Matthew* that a request is forwarded in a least delay path as featured in Claim 1. In *Matthew*, the request for setting up a best path for a connection is sent to the NMS (which consumes the request and never forwards the request to the destination switch and which is not part of any least delay path between the source switch and the destination switch). Indeed, there is neither a need nor any disclosure in *Matthew* for a data packet to specify the QoS requirement or for a router to receive the QoS requirement in the data packet, as the connection in *Matthew* is set up once initially using the out-of-band network management server and the priority setting

for the connection is fixed during the connection.

The Office Action also argues that *Di Caro* discloses that **a first set of routers that are on said least-delay path is in a pheromone table on the first router**. The Office Action states "see page 326 Algorithm step 2, the identifier of every visited node k and the time elapsed are pushed onto a memory stack, wherein the memory stack corresponds to the pheromone table." This is a mischaracterization of *Di Caro* and Claim 1.

The least-delay path of Claim 1 (which recites "determining … said least-delay path… if the least-delay path satisfies the QoS requirement … sending said first data packet to a second router in said least-delay path") is a path subsequent to, therefore, is different from, the previously traversed path for the first data packet, whereas information in the memory stack in *Di Caro*, cited by the Office Action as the least-delay path of Claim 1, at best records the previously traversed path, which is unlikely to be a least delay path that has yet to be traversed. Indeed, as noted previously, *Di Caro* has no notion of a least-delay path. *Di Caro* relies on probability to explore all the possible paths.

Furthermore, Claim 1 features that the first set of routers on the least-delay path is in a pheromone table on a first router that receives a first data packet. The memory stack of *Di Caro*, on the other hand, is not in a pheromone table on a router. Rather, the cited portion of *Di Caro* discloses a memory stack of a mobile agent (i.e., an ant packet). There is no disclosure in *Di Caro* that the memory stack on the mobile agent, which is clearly mobile with respect to routers, is a pheromone table.

Matthew is also devoid of any mention of a pheromone table.

It is respectfully submitted that the combination of *Di Caro* and *Matthew* further

conflict with the teaching of at least one of the references, and violates at least one

principle of operation of the references.

A probabilistic model is fundamental to the operation of *Di Caro*. As described

in *Di Caro*, all the steps, generating packets, selecting neighbor nodes to forward,

updating routing information, etc., are all inextricably tied to the probabilistic model. For

example, as *Di Caro* indicates on page 328 (item 7.i), "[t]he **statistical model** has to be

able to capture this variability and to follow in a robust way the fluctuations of the traffic.

This model plays a critical role in the routing table updating process (see item (ii)

below)" (emphasis added). Furthermore, according to *Di Caro*, routing performance is

improved under the AntNet because of the use of probabilistic entries (on page 330, "**The**

use of probabilistic entries is very specific to AntNet and we observed it to be

effective, improving the performance, in some cases, even by 30%-40%. Routing tables

are used in **a probabilistic way not only** by the ants **but also** by the data packets. This

has been observed to improve AntNet performance, which means that the way the

routing tables are built in AntNet is **well matched with a probabilistic distribution** of

the data packets over all the good paths" (emphasis added)). Therefore, in *Di Caro*, the

ant packets do not necessarily follow a least-delay path. Rather, paths with small or large

probabilities will be explored probabilistically. At most, the more probable paths will be

explored more frequently, whereas the less probable paths will be explored less

frequently.

A combination of *Matthew* (which discloses that a best path is to be

deterministically picked based on a Metric Z and which further stipulates that all packets

in a connection, set up by the network management server, follow the same path) and *Di*

Caro, as suggested by the Office Action, completely vitiates the advantages gained by the

probabilistic model of *Di Caro*, rendering the critical role played by the probabilistic

model in *Di Caro* unfulfilled.

For the reasons given above, Claim 1 is patentable over *Di Caro* in view of

Matthew. Reconsideration is respectfully requested.

Claims 10, 14, and 18

Claims 10, 14, and 18 each recite similar features as those discussed above with

respect to Claim 1. Therefore, Claims 10, 14, and 18 are patentable for at least the same

reasons discussed above as to Claim 1. Reconsideration is respectfully requested.

Claims 2-4, 11-13, 15-17, and 19-21

Claims 2-4, 11-13, 15-17, and 19-21 are dependent upon and thus include each

and every feature of Claim 1, 10, 14, or 18 discussed above. Therefore, it is respectfully

submitted that Claims 2-4, 11-13, 15-17, and 19-21 are allowable for at least the reasons

given above with respect to Claim 1, 10, 14, or 18. Reconsideration is respectfully

requested.

B.   35 U.S.C. 103(a) —*CAIN* AND *DI CARO*

Claims 7-9 were rejected under 35 U.S.C. § 103(a) as being allegedly

unpatentable over Cain, et al., US Patent Pub. No. 2003/0202468 in view of *Di Caro*.

This rejection is moot as Claims 7-9 have been canceled.

III.   CONCLUSION

For the reasons set forth above, Applicant respectfully submits that all pending

claims are patentable over the art of record, including the art cited but not applied.

Accordingly, allowance of all claims is hereby respectfully solicited.

The Examiner is respectfully requested to contact the undersigned by telephone if

it is believed that such contact would further the examination of the present application.

Respectfully submitted,

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